

REMARKS

Claims 23-44, all the claims pending in the application, stand rejected. Claims 23, 35, 39, 40, 42 and 44 are amended.

Support for the amendments to claims 23, 35, 40, and 42 can be found on page 18, lines 14-17 of the specification.

Support for the amendment to claims 39 and 44 can be found on page 34, lines 2-7 of the specification.

Claim Rejections - 35 USC § 103

Claims 23, 28 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188). This rejection is traversed for at least the following reasons.

Claim 23

Independent claim 23 has been amended to specify that the claimed method for managing a plurality of denitration catalysts in an exhaust-gas denitration system comprises a step of

“measuring a performance of the denitration catalysts separately for each of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x.” This feature is not found in any of the cited art, making the claim novel and unobvious over the prior art.

Bailey et al.

Bailey et al states at paragraph [0030],

“The first and second sensors can be traditional stoichiometric “switch” sensors that signal the OBD when they fuel mixture comprises a lean A/F ratio ... or a rich A/F ratio ..., and A/F ratios falling between those rich and lean values, The third sensor can act as a WRAF/NO_x sensor that provides a range of A/F ratio values, and can indicate, for example, the nitrogen oxides concentration in the exhaust stream. When placed in combination, the switch sensors and WRAF/NO_x sensor can measure the regeneration time period ... ”.

No sensor disclosed in Bailey measures a performance of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x. The third sensor in Bailey measures the nitrogen oxide concentration in the exhaust stream but does not measure inlet NH₃ or inlet NO_x.

Thus, the claim is patentable over the prior art and should be allowed.

Claims 28 and 32

These claims depend from claim 23 and would be patentable for the same reasons given for their parent claim.

Claims 24 and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of Wakamoto (US 6,199,372). This rejection is traversed for at least the following reasons.

Claim 24

The Examiner admits that claim 24, which depends from claim 23, is not met by Bailey et al because Bailey is silent as to “wherein the regeneration process includes a plurality of types of regeneration processes, and selecting an optimum type from among the types of the regeneration processes.” The Examiner looks to Wakamoto for such teaching, particularly at col. 3, lines 18-47, col. 5, lines 31-43 and col. 5, lines 50-52.

Wakamoto

The Wakamoto reference discloses a NO_x concentration sensor 15, a temperature sensor 14, and a hydrocarbon concentration sensor 12. Wakamoto does not teach or suggest that those sensors measure a performance of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x.

Thus, the claim is patentable over the prior art and should be allowed.

Claims 35 and 36

Claim 35 has been amended to add the limitation that a performance of the denitration catalysts is measured in consideration of a ratio of inlet NH₃ to inlet NO_x. Claim 36 depends from claim 35.

Bailey et al

Regarding independent claim 35 and dependent claim 36, the Examiner admits that Bailey is silent as to determining an execution timing for regeneration of the denitration catalysts and for replacement of the denitration catalysts, for each of the denitration catalysts based on the performance. The Examiner looks to Wakamoto for such teaching at col. 4 lines 37-40.

Wakamoto

As already demonstrated, neither of Bailey et al or Wakamoto teach that sensors measure a performance of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x.

Thus, these claims would be patentable.

Claim 37

Claim 37 depends from claim 35 and would be patentable because of that dependency.

Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of Wakamoto (US 6,199,372) and further in view of Inatsune et al. (US 4,726,935). This rejection is traversed for at least the following reasons.

The Examiner asserts that “Bailey/Wakamoto teaches the elements of claim 35” but admits that they are silent as to a periodic maintenance for the denitration catalysts, extracting a sample of each of the denitration catalysts, and measuring a performance of the sample. The Examiner looks to Inatsune for such teaching at col. 3 lines 50-51 and col. 3 lines 54-62.

Inatsune et al

None of Bailey/Wakamoto or Inatsune et al discloses, teaches or suggests that sensors measure a performance of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x.

Thus, claim 38, which depends from claim 35, would be patentable because of that dependency.

Claims 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of Wakamoto (US 6,199,372) and further in view of Morii et al. (US 4,925,640). This rejection is traversed for at least the following reasons.

The Examiner admits that Bailey does not teach replacing the catalyst with one that has been used in another exhaust gas denitration system and that has undergone regeneration. The Examiner looks to Morii for a teaching of a method for the denitration of exhaust gas using catalysts and a teaching that replacing catalyst can lead to an increase in costs and regenerating catalysts is more economical, as recited in dependent claim 25.

Morii et al

None of Bailey/Wakamoto or Morii et al discloses, teaches or suggests that sensors measure a performance of the denitration catalysts in consideration of a ratio of *inlet* NH₃ to *inlet* NO_{3s}.

Thus, claim 25, which depends from claim 23, would be patentable because of that dependency.

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of (Morii et al. US 4,925,640). This rejection is traversed for at least the following reasons.

Claims 26 and 27 depend from claim 23, which has been distinguished from Bailey et al. Morii is cited for a method for the denitration of exhaust gas using catalysts and teaches that replacing catalyst can lead to an increase in costs and regenerating catalysts is more economical.

None of Bailey or Morii et al discloses, teaches or suggests that sensors measure a performance of the denitration catalysts in consideration of a ratio of *inlet* NH₃ to *inlet* NO_{3s}.

Thus, claims 26 and 27, which depend from claim 23, would be patentable because of that dependency.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of Inatsune et al. (US 4,726,935). This rejection is traversed for at least the following reasons.

Claim 29 depends from claim 23, which has been distinguished from Bailey et al. None of Bailey et al or Inatsune et al discloses, teaches or suggests that sensors measure a performance of the denitration catalysts in consideration of a ratio of *inlet* NH₃ to *inlet* NO_{3s}.

Thus, claim 29 would be patentable because of that dependency.

Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of Lee et al. (US 4,661,468). This rejection is traversed for at least the following reasons.

Claims 30 and 31 depend from claim 23, which has been distinguished from Bailey et al. Lee et al is cited for a teaching of a catalyst used to remove NO_x and a teaching that a shape of the catalysts have an effect on the catalysts ability, with reference to col. 3 lines 9-11.

None of Bailey or Lee et al discloses, teaches or suggests that sensors measure a performance of the denitration catalysts in consideration of a ratio of *inlet* NH₃ to *inlet* NO_{xs}.

Thus, claims 30 and 31, which depend from claim 23, would be patentable because of that dependency.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of Richardson et al. (US 6,258,981). This rejection is traversed for at least the following reasons.

Claim 33 depends from claim 32, which already has been distinguished over Bailey et al alone. The Examiner admits that Bailey et al does not teach adding a denitration catalyst that has been used in another exhaust-gas denitration system and that has undergone regeneration. The Examiner looks to Richardson for such teaching at col. 2 lines 49-50.

Neither of Bailey et al or Richardson et al discloses, teaches or suggests that sensors measure a performance of the denitration catalysts in consideration of a ratio of *inlet* NH₃ to *inlet* NO_{xs}.

Thus, claim 33 would be patentable because of that dependency.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al. (US 2003/0032188) in view of Richardson et al. (US 6,258,981) and further in view of Lee et al. (US 4,661,468). This rejection is traversed for at least the following reasons.

Claim 34 depends from claim 32, which already has been distinguished over Bailey et al alone. The Examiner admits that Bailey et al does not teach altering a shape of a denitration catalyst to be added. The Examiner looks to Lee et al at col. 3 lines 9-11. The relevance of Richardson et al is not explained.

In any event, none of Bailey et al or Richardson et al or Lee et al discloses, teaches or suggests that sensors measure a performance of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x.

Thus, claim 34 would be patentable because of that dependency. Lee teaches a catalyst used to remove NO_x and teaches that shape of the catalysts have an effect on the catalysts ability (col. 3 lines 9-11).

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Griffin US (5,896,743) in view of Wakamoto (US 6,199,372). This rejection is traversed for at least the following reasons.

Regarding independent claim 39, which concerns a method for managing a denitration catalyst and has been amended to state the step of “determining execution timing for and for addition of a new denitration catalyst, besides already provided denitration catalysts, based on the performance.

The Examiner asserts that Griffin teaches the method as claimed with reference to col. 1 lines 8-9, col. 1 lines 50-52 and col. 4 lines 58-60. The Examiner admits that Griffin is silent as to determining execution timing for regeneration of the denitration catalysts. The Examiner looks to Wakamoto for such teaching.

Griffin

Griffin only discloses an oxygen sensor and a temperature sensor. Griffin states at column 4, lines 56-60, “[t]he indicator 24 is preferably a light or LED ,, which ... informs the vehicle operator that the catalyst 15 ... may need to be replaced.”

Wakamoto

Wakamoto is cited for its teaching at col. 4, lines 37-40 that a catalyst can be regenerated. However, the teaching is incompatible with the arrangement in Griffin, which has the catalyst replaced.

According to claim 39, a denitration catalyst is added, contrary to what the Griffin disclose. Griffin does not disclose a feature of “determining execution timing for ... and for addition of a new denitration catalyst besides already provided denitration catalysts based on the

performance". Wakamoto does not teach or suggest a reason or way to modify Griffin, directly contrary to its teachings of a replaceable catalyst.

Thus, this claim would be patentable.

Claims 40-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Griffin (US 5,896,743) in view of Bailey et al. (US 2003/0032188). This rejection is traversed for at least the following reasons.

Claims 40 and 41

Claim 40 has been amended to add the limitation that a performance of the denitration catalysts is measured in consideration of a ratio of inlet NH₃ to inlet NO_x. Claim 41 depends from claim 40.

Regarding independent claim 40 and dependent claim 41, the Examiner admits that Griffin is silent as to as to determining when regeneration of the denitration catalysts is to be performed. The Examiner looks to Bailey for teaching an apparatus for managing a denitration catalyst (catalyst performance diagnostics system [0007]) comprising a determining unit that determines when regeneration should be performed ([0020])...

As already demonstrated, neither of Bailey et al or Griffin teach that sensors measure a performance of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x.

Thus, these claims would be patentable.

Claims 42 and 43

Regarding independent claim 42 and dependent claim 43, the Examiner admits that Griffin is silent as to as to a determining unit that determines when regeneration of the denitration catalysts is to be performed. The Examiner looks to Bailey for teaching an apparatus for managing a denitration catalyst (catalyst performance diagnostics system [0007]) comprising a determining unit that determines when regeneration should be performed ([0020]).

As already demonstrated, neither of Bailey et al or Griffin teach that sensors measure a performance of the denitration catalysts in consideration of a ratio of inlet NH₃ to inlet NO_x.

Thus, these claims would be patentable.

Claim 44

Claim 44 has been amended to recite the same limitation added to claim 39. Applicants already have demonstrated that Griffin teaches a replaceable catalyst. Bailey does not remedy that deficiency.

The Bailey reference states at paragraph [0005],

"[t]his decrease can indicate that the catalyst's efficiency is decreasing, which signals the need to replace the catalytic converter".

Since both references rely upon a design where the catalyst is replaceable, they cannot render a denitration catalyst. Thus the claim would be patentable.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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CUSTOMER NUMBER

Date: January 22, 2009

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